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SUTHERLAND ASBILL & BRENNAN LLP 999 PEACHTREE STREET, N.E. ATLANTA, GA 30309			EXAMINER VERDIER, CHRISTOPHER M	
			ART UNIT 3745	PAPER NUMBER

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Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/707,421

Applicant(s)

BEDDARD ET AL.

Examiner

Christopher Verdier

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 2-10-05.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18-20 is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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Applicants' Amendment dated February 10, 2005 has been carefully considered but is deemed non-persuasive. Claims 1-20 are pending. The specification has been amended to correct the informalities set forth in the first Office action. The claims have been amended to overcome the objections as containing informalities and the rejections under 35 USC 112, second paragraph set forth in the first Office action. Correction of the above matters is noted with appreciation.

The examiner finds Applicants' arguments that independent claim 1 as amended defines over the previously applied references to be persuasive. However, during an update of the search, Tomberg 2005/0047914, assigned to the same assignee of the instant application, was published after the issuance of the first Office action. Rejections based thereon are set forth below.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4, 6-8, 10, 12-13, and 15-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Tomberg 2005/0047914. Note the airfoil 36 comprising a first plurality of cooling

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holes 54 (holes 1-4) positioned within the airfoil, the first plurality of cooling holes comprising a turbulated section 60 and a non-turbulated section (the smooth bore section), a second plurality of cooling holes 56 (holes 5-7) positioned within the airfoil, the second plurality of cooling holes comprising a turbulated section 62 and a non-turbulated section (the smooth bore section), with the turbulated section of the first plurality of cooling holes comprising a first length and the turbulated section of the second plurality of cooling holes comprising a second length, the first length being different from the second length. The turbulated section of the first plurality of cooling holes has a first diameter, and the non-turbulated section of the first plurality of cooling holes has a second diameter, with the first diameter being larger than the second diameter. The turbulated section of the first plurality of cooling holes comprises ribs 61 therein, and the non-turbulated section of the first plurality of cooling holes comprises a plurality of non-turbulated sections (the smooth bore sections). The second plurality of cooling holes 56 comprises two cooling holes (although there is a total of three cooling holes for the second plurality of cooling holes, "comprises" is open claim language and thus is met by the provision of the three cooling holes). The turbulated section of the second plurality of cooling holes has a first diameter, and the non-turbulated section of the second plurality of cooling holes has a second diameter, with the first diameter being larger than the second diameter. The non-turbulated section of the second plurality of cooling holes comprises a plurality of non-turbulated sections (the smooth bore sections), and a third plurality of cooling holes 58 (holes 8-10) is provided, with the third plurality comprising a non-turbulated section. Concerning claim 15, there are ten total cooling holes that comprise the first plurality of cooling holes, the second plurality of cooling holes, and the third plurality of cooling holes, which meets the open claim language that these cooling holes

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"comprise" nine cooling holes, for the same reason set forth above. Note the tenth cooling hole 10.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 2 is rejected under 35 U.S.C. 103(a) as being obvious over Tomberg 2005/0047914. Tomberg discloses an airfoil substantially as claimed as set forth above, including a first plurality of cooling holes 52, comprising four holes in total. However, Tomberg does not disclose that the first plurality of cooling holes comprises five cooling holes.

The recitation of the number of the first plurality of cooling holes being five is a matter of choice in design. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to select the number of the first plurality of cooling holes to be a specific number, such as five as opposed to the four disclosed by Tomberg, for the purpose of providing increased cooling of the airfoil, because a person having ordinary skill in the art would recognize that providing additional cooling holes would provide increased cooling of the airfoil.

Claims 3 and 9 are rejected under 35 U.S.C. 103(a) as being obvious over Tomberg 2005/0047914. Tomberg discloses an airfoil substantially as claimed as set forth above, including a first plurality of cooling holes 54 (holes 1-4) positioned within the airfoil, the first plurality of cooling holes comprising a turbulated section 60, and a second plurality of cooling holes 56 (holes 5-7) positioned within the airfoil, the second plurality of cooling holes comprising a turbulated section 62, with the turbulated section of the first plurality of cooling holes comprising a first length and the turbulated section of the second plurality of cooling holes

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comprising a second length, the first length being different from the second length. The first plurality of cooling holes has a first and a second end, and the second plurality of cooling holes has a first and a second end. The first plurality of cooling holes extends from about 53 percent of the length of the first plurality of cooling holes from the first end to about 85 percent of the length of the first plurality of cooling holes from the first end. The second plurality of cooling holes extends from about 70 percent of the length of the second plurality of cooling holes from the first end to about 81 percent of the length of the second plurality of cooling holes from the first end. The percentages of extension are obtained by adding 0.577 inches to the commencing and terminating points of the turbulated sections set forth in paragraph 25 of Tomberg, and dividing by the sum of the airfoil length of 11.122 inches and 0.577 inches. However, Tomberg does not disclose that first plurality of cooling holes extends from about 35 percent of the length of the first plurality of cooling holes from the first end to about 75 percent of the length of the first plurality of cooling holes from the first end (claim 3), and does not disclose that the second plurality of cooling holes extends from about 50 percent of the length of the second plurality of cooling holes from the first end to about 75 percent of the length of the second plurality of cooling holes from the first end (claim 9).

The recitation of the specific range of length extension of the turbulated sections is a matter of choice in design. The length that a turbulated section in an airfoil extends is known to be a result-effective variable selected in accordance with airfoil cooling requirements along the airfoil length in order to maintain airfoil wall temperatures within limits and to influence cooling. Therefore, it would have been obvious at the time the invention was made to a person having

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ordinary skill in the art to select/optimize the specific range of the length of extension of the turbulated sections in the airfoil of Tomberg, such that the first plurality of cooling holes extends from about 35 percent of the length of the first plurality of cooling holes from the first end to about 75 percent of the length of the first plurality of cooling holes from the first end, and such that the second plurality of cooling holes extends from about 50 percent of the length of the second plurality of cooling holes from the first end to about 75 percent of the length of the second plurality of cooling holes from the first end, for the purpose of providing adequate airfoil wall cooling, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomberg 2005/0047914. Tomberg discloses an airfoil substantially as claimed as set forth above, including a first plurality of cooling holes 54 (holes 1-4) positioned within the airfoil, the first plurality of cooling holes comprising a turbulated section 60, and a non-turbulated section (the smooth bore section), and a second plurality of cooling holes 56 (holes 5-7) positioned within the airfoil, the second plurality of cooling holes comprising a turbulated section 62, and a non-turbulated section (the smooth bore section). The turbulated section of the first plurality of cooling holes has a diameter of about 0.115 inches, and the non-turbulated section of the first plurality of cooling holes has a diameter of about 0.090 inches, while the turbulated section of the second plurality of cooling holes has a diameter of about 0.085 inches, and the non-turbulated section of the second plurality of cooling holes has a diameter of about 0.065 inches.



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However, Tomberg does not disclose that the turbulated section of the first plurality of cooling holes has a diameter of about 0.175 inches, and the non-turbulated section of the first plurality of cooling holes has a diameter of about 0.135 inches (claim 5), and does not disclose that the turbulated section of the second plurality of cooling holes has a diameter of about 0.165 inches, and the non-turbulated section of the second plurality of cooling holes has a diameter of about 0.125 inches (claim 11).

The recitation of the specific diameters of the cooling holes in the turbulated and non-turbulated sections is a matter of choice in design. The cooling hole diameter in both a turbulated section and a non-turbulated section of an airfoil is known to be a result-effective variable selected in accordance with airfoil cooling requirements along the airfoil length in order to maintain airfoil wall temperatures within limits and to influence cooling by virtue of turbulent flow in the turbulated sections. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to select/optimize the specific values for the diameters of the cooling holes in the turbulated and non-turbulated in the airfoil of Tomberg, such that the turbulated section of the first plurality of cooling holes has a diameter of about 0.175 inches, and the non-turbulated section of the first plurality of cooling holes has a diameter of about 0.135 inches, and such that the turbulated section of the second plurality of cooling holes has a diameter of about 0.165 inches, and the non-turbulated section of the second plurality of cooling holes has a diameter of about 0.125 inches, for the purpose of maintaining airfoil wall temperatures within limits and to influencing cooling by virtue of turbulent flow in the turbulated

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sections, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomberg 2005/0047914 in view of Chiu 5,413,463. Tomberg discloses an airfoil substantially as claimed as set forth above, including a non-turbulated section of a third plurality of cooling holes 58, but does not disclose that the non-turbulated section of third plurality of cooling holes has a diameter of about 0.115 inches.

Chiu (figures 2 and 4) shows an airfoil having cooling holes 26 that have smooth bores 38, 40, and column 4, lines 47-61 show that the smooth tube diameter may be 0.115 inches, for the purpose of providing adequate cooling of the airfoil.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the non-turbulated section of third plurality of cooling holes of the airfoil of Tomberg 2005/0047914 such that the diameter is about 0.115 inches, as taught by Chiu, for the purpose of providing adequate cooling of the airfoil. Although Chiu teaches that part of the length of the cooling holes is turbulated, Chiu is considered to teach that the diameter for normal smooth bore airfoil cooling holes is about 0.115 inches.

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Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomberg 2005/0047914 in view of North 5,117,626. Tomberg discloses an airfoil substantially as claimed as set forth above, including a non-turbulated section of a third plurality of cooling holes 58, having a tenth cooling hole 10, but does not disclose that the non-turbulated section of the tenth cooling hole has a diameter of about 0.08 inches.

North (figure 3 and column 6, lines 24-33) shows a cooled airfoil with cooling holes 8, 9, 10 having a diameter of 0.05-0.08 inches, for the purpose of ensuring high velocity cooling air flow through the holes.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the tenth cooling hole of the airfoil of Tomberg 2005/0047914 such that the tenth cooling hole has a diameter of about 0.08 inches, as taught by North, for the purpose of ensuring high velocity cooling air flow through the holes.

The applied reference to Tomberg has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective

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U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 7, 8, 12, 13, 15, and 16 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable all over claim 20 of copending Application No. 10/653,349. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 20 of the copending application 10/653,349 "anticipates" claims 1, 7-8, 12-13, and 15-16 of the instant application. Accordingly,

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the claims 1, 7-8, 12-13, and 15-16 of the instant application are not patentably distinct from claim 20 of the copending application. Here, claim 20 of the copending application requires an air cooled bucket for a turbine, the cooling holes extending between the root and tip portions of the airfoil and exiting at the tip, first, second and third sets of cooling holes with each set of holes having at least two holes, with the first set of holes extending adjacent the leading edge of the airfoil, the second set of cooling holes extending intermediate of first and third sets of cooling holes, and the third set of cooling holes extending adjacent the trailing edge of the airfoil, and two holes of the third set of holes having smooth bores throughout their entire length, while claims 1, 7-8, 12-13, and 15-16 of the instant application do not require these features. Thus it is apparent that the more specific claim 20 of the copending application 10/653,349 encompasses claims 1, 7-8, 12-13, and 15-16 of the instant application. Following the rationale in *In re Goodman* cited in the preceding paragraph, where applicant has once been granted a patent containing a claim for the specific or narrower invention, applicant may not then obtain a second patent with a claim for the generic or broader invention without first submitting an appropriate terminal disclaimer. Note that since claims 1, 7-8, 12-13, and 15-16 of the instant application are anticipated by claim 20 of the copending application 10/653,349 and since anticipation is the epitome of obviousness, then claims 1, 7-8, 12-13, and 15-16 of the instant application are obvious over claim 20 of the copending application 10/653,349.

Claim 2 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 20 of copending Application No. 10/653,349. Claim 20 of copending application 10/653,349 claims substantially the same subject matter as claim 2

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of the instant application, but does not claim that the first plurality of cooling holes comprises five cooling holes.

The recitation of the number of the first plurality of cooling holes being five is a matter of choice in design. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to select the number of the first plurality of cooling holes to be a specific number, such as five, for the purpose of providing increased cooling of the airfoil, because a person having ordinary skill in the art would recognize that providing additional cooling holes would provide increased cooling of the airfoil.

Claims 3 and 9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable all over claim 20 of copending application 10/653,349. Claim 20 of the copending application 10/653,349 claims substantially the same subject matter as claims 3 and 9 of the instant application, including the first plurality of cooling holes extending from about 45-55 percent of the airfoil length from the root to the tip to about 70-80 percent of the airfoil length from the root to the tip, with the second plurality of cooling holes extending from about 30-40 percent of the airfoil length from the root to the tip to about 75-85 percent of the length of the airfoil length from the root to the tip. However, claim 20 of the copending application 10/653,349 does not claim that the first plurality of cooling holes extends from about 35 percent of the length of the first plurality of cooling holes from the first end of the cooling holes to about 75 percent of the length of the first plurality of cooling holes from the first end of the cooling holes (claim 3), and does not claim that the second plurality of cooling holes

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extends from about 50 percent of the length of the second plurality of cooling holes from the first end of the cooling holes to about 75 percent of the length of the second plurality of cooling holes from the first end of the cooling holes (claim 9).

The recitation of the specific range of length extension of the turbulated sections is a matter of choice in design. The length that a turbulated section in an airfoil extends is known to be a result-effective variable selected in accordance with airfoil cooling requirements along the airfoil length in order to maintain airfoil wall temperatures within limits and to influence cooling. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to select/optimize the specific range of the length of extension of the turbulated sections, such that the first plurality of cooling holes extends from about 35 percent of the length of the first plurality of cooling holes from the first end to about 75 percent of the length of the first plurality of cooling holes from the first end, and such that the second plurality of cooling holes extends from about 50 percent of the length of the second plurality of cooling holes from the first end to about 75 percent of the length of the second plurality of cooling holes from the first end, for the purpose of providing adequate airfoil wall cooling, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 4 and 5 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 20 of copending Application No. 10/653,349 in view of Chiu 5,413,463. Claim 20 of copending application 10/653,349 claims substantially

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the same subject matter as claims 4 and 5 of the instant application, but does not claim that the turbulated section of the first plurality of cooling holes has a first diameter, and the non-turbulated section of the first plurality of cooling holes has a second diameter, with the first diameter being larger than the second diameter (claim 4), with the turbulated section of the first plurality of cooling holes having a diameter of about 0.175 inches, and the non-turbulated section of the first plurality of cooling holes having a diameter of about 0.135 inches (claim 5).

Chiu (figures 2 and 4) shows an airfoil having cooling holes 26 having a turbulated section 42/44 and a non-turbulated section 38, 40, with the first diameter of the cooling holes of the turbulated section being larger than the second diameter of the cooling holes of the non-turbulated section, for the purpose of providing cooling along the airfoil length to maintain the airfoil wall temperatures within design limits.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the airfoil of claim 20 of the copending application 10/653,349 such that the turbulated section of the first plurality of cooling holes has a first diameter, and the non-turbulated section of the first plurality of cooling holes has a second diameter, with the first diameter being larger than the second diameter, as taught by Chiu, for the purpose of providing cooling along the airfoil length to maintain the airfoil wall temperatures within design limits.

The recitation in claim 5 of the specific diameters of the cooling holes in the turbulated and non-turbulated sections is a matter of choice in design. The cooling hole diameter in both a



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turbulated section and a non-turbulated section of an airfoil is known to be a result-effective variable selected in accordance with airfoil cooling requirements along the airfoil length in order to maintain airfoil wall temperatures within limits and to influence cooling by virtue of turbulent flow in the turbulated sections. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to select/optimize the specific values for the diameters of the cooling holes in the turbulated and non-turbulated sections, such that the turbulated section of the first plurality of cooling holes has a diameter of about 0.175 inches, and the non-turbulated section of the first plurality of cooling holes has a diameter of about 0.135 inches, for the purpose of maintaining airfoil wall temperatures within limits and to influence cooling by virtue of turbulent flow in the turbulated sections, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 6 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 20 of copending Application No. 10/653,349 in view of Chiu 5,413,463. Claim 20 of copending application 10/653,349 claims substantially the same subject matter as claim 6 of the instant application, but does not claim that the turbulated section of the first plurality of cooling holes comprises ribs therein.

Chiu (figures 2 and 4 and column 4, lines 45-61) shows an airfoil having cooling holes 26 having a turbulated section 42/44 and a non-turbulated section 38, 40, with the turbulated section having unnumbered ribs therein, for the purpose of providing enhanced heat transfer in the

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cooling holes, thus providing cooling along the airfoil length to maintain the airfoil wall temperatures within design limits.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the airfoil of claim 20 of the copending application 10/653,349 such that the turbulated section of the first plurality of cooling holes comprises ribs therein, as taught by Chiu, for the purpose of providing enhanced heat transfer in the cooling holes, thus providing cooling along the airfoil length to maintain the airfoil wall temperatures within design limits.

Claims 10 and 11 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 20 of copending Application No. 10/653,349 in view of Chiu 5,413,463. Claim 20 of copending application 10/653,349 claims substantially the same subject matter as claims 10 and 11 of the instant application, but do not claim that the turbulated section of the second plurality of cooling holes has a first diameter, and the non-turbulated section of the second plurality of cooling holes has a second diameter, with the first diameter being larger than the second diameter (claim 10), with the turbulated section of the second plurality of cooling holes having a diameter of about 0.165 inches, and the non-turbulated section of the second plurality of cooling holes having a diameter of about 0.125 inches (claim 11).

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Chiu (figures 2 and 4) shows an airfoil having cooling holes 26 having a turbulated section 42/44 and a non-turbulated section 38, 40, with the first diameter of the cooling holes of the turbulated section being larger than the second diameter of the cooling holes of the non-turbulated section, for the purpose of providing cooling along the airfoil length to maintain the airfoil wall temperatures within design limits.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the airfoil of claim 20 of the copending application 10/653,349 such that the turbulated section of the second plurality of cooling holes has a first diameter, and the non-turbulated section of the second plurality of cooling holes has a second diameter, with the first diameter being larger than the second diameter, as taught by Chiu, for the purpose of providing cooling along the airfoil length to maintain the airfoil wall temperatures within design limits.

The recitation in claim 11 of the specific diameters of the cooling holes in the turbulated and non-turbulated sections is a matter of choice in design. The cooling hole diameter in both a turbulated section and a non-turbulated section of an airfoil is known to be a result-effective variable selected in accordance with airfoil cooling requirements along the airfoil length in order to maintain airfoil wall temperatures within limits and to influence cooling by virtue of turbulent flow in the turbulated sections. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to select/optimize the specific values for the diameters of the cooling holes in the turbulated and non-turbulated sections, such that the

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turbulated section of the second plurality of cooling holes has a diameter of about 0.165 inches, and the non-turbulated section of the second plurality of cooling holes has a diameter of about 0.125 inches, for the purpose of maintaining airfoil wall temperatures within limits and to influence cooling by virtue of turbulent flow in the turbulated sections, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 14 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 20 of copending Application No. 10/653,349 in view Chiu 5,413,463. Claim 20 of the copending application 10/653,349 claims substantially the same subject matter as claim 14 of the instant application, including a plurality of third cooling holes, but does not claim that the non-turbulated section of third plurality of cooling holes has a diameter of about 0.115 inches.

Chiu (figures 2 and 4) shows an airfoil having cooling holes 26 that have smooth bores 38, 40, and column 4, lines 47-61 show that the smooth tube diameter may be 0.115 inches, for the purpose of providing adequate cooling of the airfoil.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the non-turbulated section of the third plurality of cooling holes of claim 20 of the copending application 10/653,349 such that the diameter is about 0.115 inches, as taught by Chiu, for the purpose of providing adequate cooling of the airfoil. Although Chiu

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teaches that part of the length of the cooling holes is turbulated, Chiu is considered to teach that the diameter for normal smooth bore airfoil cooling holes is about 0.115 inches.

Claim 17 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 20 of copending Application No. 10/653,349 in view of North 5,117,626. Claim 20 of the copending application 10/653,349 claims substantially the same subject matter as claim 17 of the instant application, including an inherent tenth cooling hole, but does not claim that the non-turbulated section of the tenth cooling hole has a diameter of about 0.08 inches.

North (figure 3 and column 6, lines 24-33) shows a cooled airfoil with cooling holes 8, 9, 10 having a diameter of 0.05-0.08 inches, for the purpose of ensuring high velocity cooling air flow through the holes.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the tenth cooling hole of claim 20 of the copending application 10/653,349 such that the tenth cooling hole has a diameter of about 0.08 inches, as taught by North, for the purpose of ensuring high velocity cooling air flow through the holes.

These are provisional obviousness-type double patenting rejections because the conflicting claims have not in fact been patented.

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*Allowable Subject Matter*

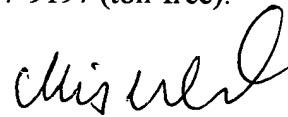
Claims 18-20 are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.V.  
April 20, 2005



Christopher Verdier  
Primary Examiner  
Art Unit 3745